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Director, PIC

8 June 1959

Special Assistant to the Director, PIC

Catadioptric Lenses

1. A catadioptric lens system designed for aerial use with a desired focal length of 48 inches probably would have the following characteristics:

- Effective aperture: f4.0
- Hyperfocal distance: 66,000 feet
- Effective Resolution: 360 lines/mm
- Field of view: 5°
- Format size: 70mm
- Weight: Approximately $\frac{1}{2}$ that of a similar conventional system
- Cube: Three-fourths less space occupied in the Z axis and approximately the same space occupied in the X and Y axes as a conventional system.
- Cost: Approximately the same as a conventional system

Enclosure (1) is a graph showing the change in Hyperfocal distance and the change in resolution as the aperture changes.

In order to eliminate the sensitivity to temperature change, the mirrors and optics should be made of quartz and the metal parts of invar metal. In addition, it would be best to encapsulate the entire system in order to more easily control the environment.

The catadioptric lens may have its mirror surfaces coated with different substances which will cut off any of the spectrum below blue, green, or yellow as desired and pass the remaining portion of the spectrum without peaking or sloping off. A catadioptric lens may be panned, thus giving adequate coverage in spite of the limited field of view.

2. Old Delft of the Netherlands has been taking departures from the catadioptric system with their Schmidt-Bower lens. The Navy is presently testing such a lens at APFL, and the Air Force has just completed contracting for an F 0.85 system to be used for low-ambient light photography better known as moonlight photography.

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SUBJECT: Catadioptric Lenses

3. It is recommended that a true catadioptric system be investigated further due to its many potentialities of high resolution, compactness, and light weight. It is further recommended that the following lens designers, Dr. Turner of Bausch and Lomb, Dr. Robert B. Gallipeau of Boston, Massachusetts, Dr. Bower of Old Delft in the Netherlands, and Mr. Heinz Kilfitt of Munich, Germany, be contacted in order to better determine the feasibility of a catadioptric system.

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Enclosure

Distribution:

Orig - Addressee

1 - [Redacted]

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2 - D/PIC files

D/PIC [Redacted]

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